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THE PLANT DISEASE REPORTER

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THE OFFICE OF MYCOLOGY AND DISEASE SURVEY

Volume XIV Number 12

June 15, 1930

BUREAU OF
PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE REPORTER

Issued by

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OFFICE OF MYCOLOGY AND DISEASE SURVEY

Vol. XIV June 15, 1930 Number 12

DISEASES OF SPECIAL CROPS

DOWNY MILDEW OF HOPS APPEARS IN OREGON

A telegram from H. P. Barss (June 9) states that: "There is a serious outbreak of Pseudoperonospora humuli in the central Willamette Valley of Oregon. Two small acreages are practically ruined and scattered infections have been found in other places. Microscopic examination has confirmed the diagnosis made in the field, where all the symptoms described for downy mildew are reproduced exactly. The exact distribution and damage are not known at present. The disease was first noticed about a month ago but was not recognized by the growers who sent specimens. It is most severe on the variety Early Cluster, while Fuggles is little affected. The growers are starting to spray with Bordeaux."

Pseudoperonospora humuli was observed as early as 1905 in Japan where it was evidently native on wild hops. In 1909, and frequently since then, it was collected on wild hops in Wisconsin. Since 1920 when it was first noticed in England, downy mildew has been found practically throughout Europe, and its control has become a serious problem. In 1928 it was prevalent in British Columbia. It was also reported from New York in 1928 but was not found there again in 1929.

REPORT OF TOBACCO SEED BED SURVEY IN NORTH CAROLINA

By S. G. Lehman

Disease records were taken on 85 tobacco seed beds in North Carolina by Mr. G. W. Fant and the writer. Fifty-five of these are in the Piedmont area and 30 in the Coastal Plains. These beds ranged in size from 50 to 5,300 square yards. Only three of the beds surveyed contained less than 100 square yards and

eight of them contained 1,000 square yards or more. Two hundred to 500 square yards or more. Two hundred to 500 square yards is the size most generally encountered. In addition to the 85 beds mentioned above, approximately 20 beds were examined for which no records were made. In practically all of the beds examined, the most advanced plants were of transplanting size. The earliest plants had already been taken from a few of the beds. Some of the beds were reexamined 15 to 20 days after the first visit by which time they had been pulled once and some of them twice.

The season for growth of tobacco plants was phenomenally dry, there being a great deficiency of rainfall over all the tobacco area. As a result, growth of the plants was greatly retarded, transplanting was delayed and progressed slowly. Many beds were failures and comparatively few which had not been watered had a good stand of plants. The dry condition of the beds probably prevented the development of incipient infestations in many which otherwise would have become diseased.

Mosaic was found in only two beds. In one of these, a bed of 500 yards, only two infected plants were found. These were in different parts of the bed and each showed clear evidence of mechanical injury. These two plants were removed from the bed. When the bed was visited again twenty days later, no more mosaic plants could be found. The bed was a new one on land which had been in corn the year before. A few horsenettle plants were growing in the bed and one of these showed a faint mottling which might have been due to mosaic infection. It is believed, however, that infection of the two mosaiced tobacco plants in this bed came from use of tobacco by men working in the bed since both diseased plants had been injured mechanically.

The other bed in which mosaic occurred was an old one. Two diseased plants were found in this bed on May 9, the time of the first examination. Most of the plants of transplanting size had been pulled at this time. The same bed was examined again on May 29 at which time some 20 plants were found with mosaic. Infection in this case may have come from any one of several sources. The bed was an old one and had been sterilized in no way. It lay between two tobacco curing barns at a distance of about 30 feet from each. Many weeds of several species, Solanum carolinense, S. nigrum, Phytolacca decandra, Erigeron canadensis, Eupatorium capillifolium and others were present in and about the bed.

A leaf spot (probably Phyllosticta nicotiana but having about two per cent of one-septate pycnospores) was found in 14 beds. This spot was present usually on less than one per cent of the plants, but two beds were found in which infection ranged from six to ten per cent of the plants. One bed which showed only a trace of the disease on April 30 had 15 per cent of infected plants on May 25. The spots were most numerous on the lower older leaves which had stopped growth but were not confined to them occurring also on upper leaves which were still growing.

A physiological trouble diagnosed as chlorine injury and marked by thick brittle leaves with upturned margins was found in approximately one-third of the beds examined. Usually the condition was present in spots or small areas of a bed. Six beds were found where more than 10 per cent of the plants were affected. In two beds 50 per cent, and in one bed approximately 100 per cent of the plants exhibited symptoms of the trouble.

Chlorine injury in seed beds was obviously much more prevalent this year than usual. Perhaps this may be attributed to a combined effect of unusually dry soil conditions and heavy application of chlorine containing fertilizers. The condition was relatively more prevalent in the Coastal Plains where the soils are lighter, drainage better, and fertilizer applications generally heavier than in the Piedmont. Taking into account only those beds for which information was ob-

tained relative to the rate of application of fertilizers, we found chlorine injury in 37 per cent of the beds on which more than one pound of commercial fertilizer was used per square yard. The same trouble was found on only eight per cent of the beds in which the fertilizer application was one pound or less per square yard. In these latter beds, commercial fertilizers were sometimes omitted entirely but usually light applications were made supplemented by chicken or hog manure.

The commercial fertilizer most generally used was a 3-8-3 mixture. Usually all the potash of the mixture was derived from chlorine bearing materials. Although the growers have been advised to use a fertilizer containing not more than two per cent of chlorine in their field applications, they do not follow this practice in preparation of seed beds. Consequently, chlorine is put in the beds in large quantities in proportion to the amount of potash applied. This was found to be true in most of the cases where chlorine injury occurred in beds to which one pound or less of commercial fertilizer was applied per square yard. On the other hand, in certain cases chlorine injury did not occur in locations where it was to be expected on beds to which fertilizer had been added at a high rate of application. One man used 400 pounds of a 5-7-5 mixture on 400 yards of bed. When surprise was expressed that chlorine injury had not developed, he stated that all the potash came from sulphate of potash magnesia. Another man used 400 pounds of fertilizer on 200 yards of bed where chlorine damage was to be expected with this rate of application. Chlorine injury was not found in this bed and inquiry brought out the fact that the mixture was a 4-8-0, containing no potash.

A surprising feature of this survey was the small number of beds in which any serious tobacco disease was found and the failure to find any cases of angular leaf spot, black root rot, or sore shin (Rhizoctonia) infestation. Several growers stated that they had Rhizoctonia in their beds a year ago and a number of them reported occurrence of mosaic, black root rot, blackfire, and Rhizoctonia in their fields last year. Except for the two cases of mosaic reported above, none of these diseases were found in the seed beds visited this spring. The writer believes that this relative freedom of the seed beds from disease may be attributed in part, as noted above, to the unusually dry season which prevailed while the plants were growing. A large measure of the freedom from disease may also be due to greater diffusion of knowledge concerning the cause and control of tobacco diseases among tobacco growers. The losses caused by tobacco diseases and insect pests have repeatedly been called to the attention of growers in recent years and as a result, measures of prevention and control are now being practiced more widely than ever before. The beds are usually put in the woods and in new places each year. When old beds are used, they are generally burned. More attention is being paid to seed selection, seed treatment, and elimination of sources of disease infestation.

WILDFIRE (BACTERIUM TABACUM) IN PENNSYLVANIA

There has been a considerable outbreak of wildfire in the tobacco seed beds of Lancaster County, Pennsylvania. The first reports were May 20 and 21. The rainfall occurring on the 14th and 15th appears to have been weather favoring disease development. Among 15 farms chosen at random in the eastern part of the county, three were found to have infected seed beds. As a rule, areas of infection are limited in extent since the week following the outbreak was clear. The three cases of infection were traced to a neglect of some feature of sanitation. (W. S. Beach, May 28)

TOBACCO MOSAIC IN NORTH CAROLINA

I saw 17 beds this week in six of which mosaic was present. In two cases, the beds had an extraordinary large mosaic population. The growers pulled the diseased plant when pulling plants to set in field. They discarded these affected ones. In spite of this, at least half of the plants are already mosaic in the fields. (F. A. Wolf, June 8)

REPORTS ON COTTON DISEASES

Blight (Ascochyta gossypii) in South Carolina. Specimens from Newberry, Bennettsville and Andrews received May 15 to May 20. County agent at Bennettsville reported considerable damage in river bottoms. A week later, dry weather was occurring and he reported the disease as disappearing. (G. M. Armstrong, June 15)

Sore-shin (Rhizoctonia solani) in Arkansas. Extremely wet, cool weather in early May following a long dry spell in April resulted in very large amounts of damping off and sore-shin caused by Rhizoctonia solani. Soil was so dry during April that even early planted cotton failed to germinate so that an unusually large number of seedlings were exposed to sore-shin disease when wet weather appeared early in May. (V. H. Young, June 4)

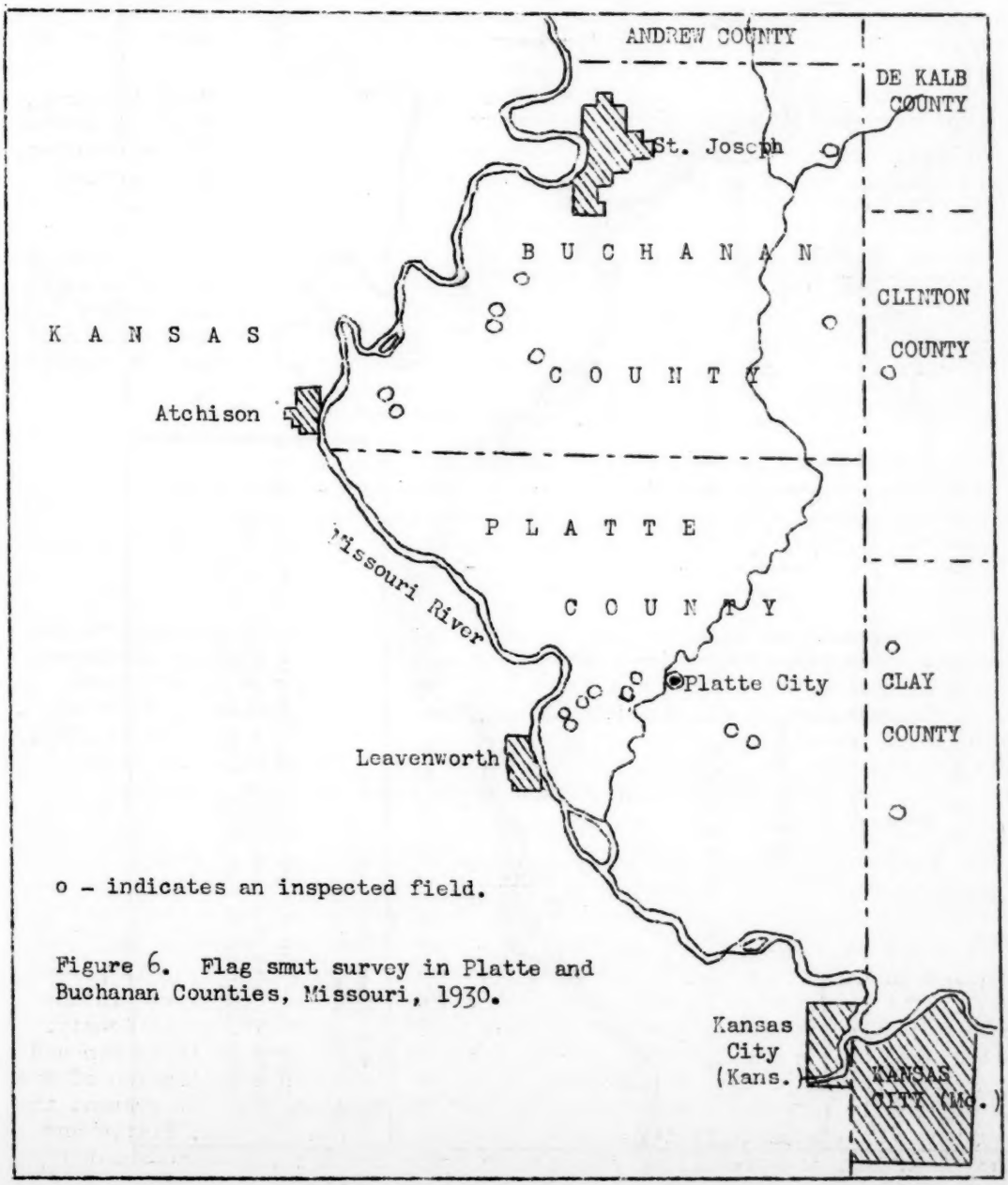
WHEAT FLAG SMUT (UROCYSTIS TRITICI) SURVEY

In the preceding issue of the Reporter (page 89) preliminary reports of the results of the resurvey being conducted to determine the present occurrence of flag smut were given. The final reports of these surveys in Missouri and Kansas are summarized below. In both States, special efforts were made to revisit the fields which were found to be infested in the earlier survey in 1923. As will be seen from the reports, the disease seems to be confined in these States to St. Louis County in Missouri and Leavenworth County in Kansas.

MISSOURI

(In the 1923 survey flag smut was found in Warren, St. Charles, St. Louis, Platte, and Buchanan Counties). The location of the inspected fields is given in Figure 6. The results of the survey show that flag smut is yet present in the state, apparently confined to rather scattered localities in St. Louis County. It is believed that a more thorough survey with a larger corps of field men and for a greater length of time would reveal a somewhat greater distribution of smut in the originally infested areas. It seems safe to conclude that at present the flag smut is not spreading in this state. In Warren, St. Charles, Platte and Buchanan Counties, the prevailing practice of adhering to legume-corn-wheat rota-

tion probably favor smut control. The general use of more or less resistant varieties of wheat probably accounts to some extent for its failure to become more widespread. Certain measures adopted in the infested areas following the discovery of flag smut nearly ten years ago have probably contributed to its control. As to what extent winter killing of infected plants has been a contributing factor in controlling smut can not be definitely determined. In the eastern part of the state, the wheat passed through the winter in excellent condition due to ample snow covering during periods of abnormally low temperatures. Contacts made with numerous farmers in the areas surveyed have shown considera-



o - indicates an inspected field.

Figure 6. Flag smut survey in Platte and Buchanan Counties, Missouri, 1930.

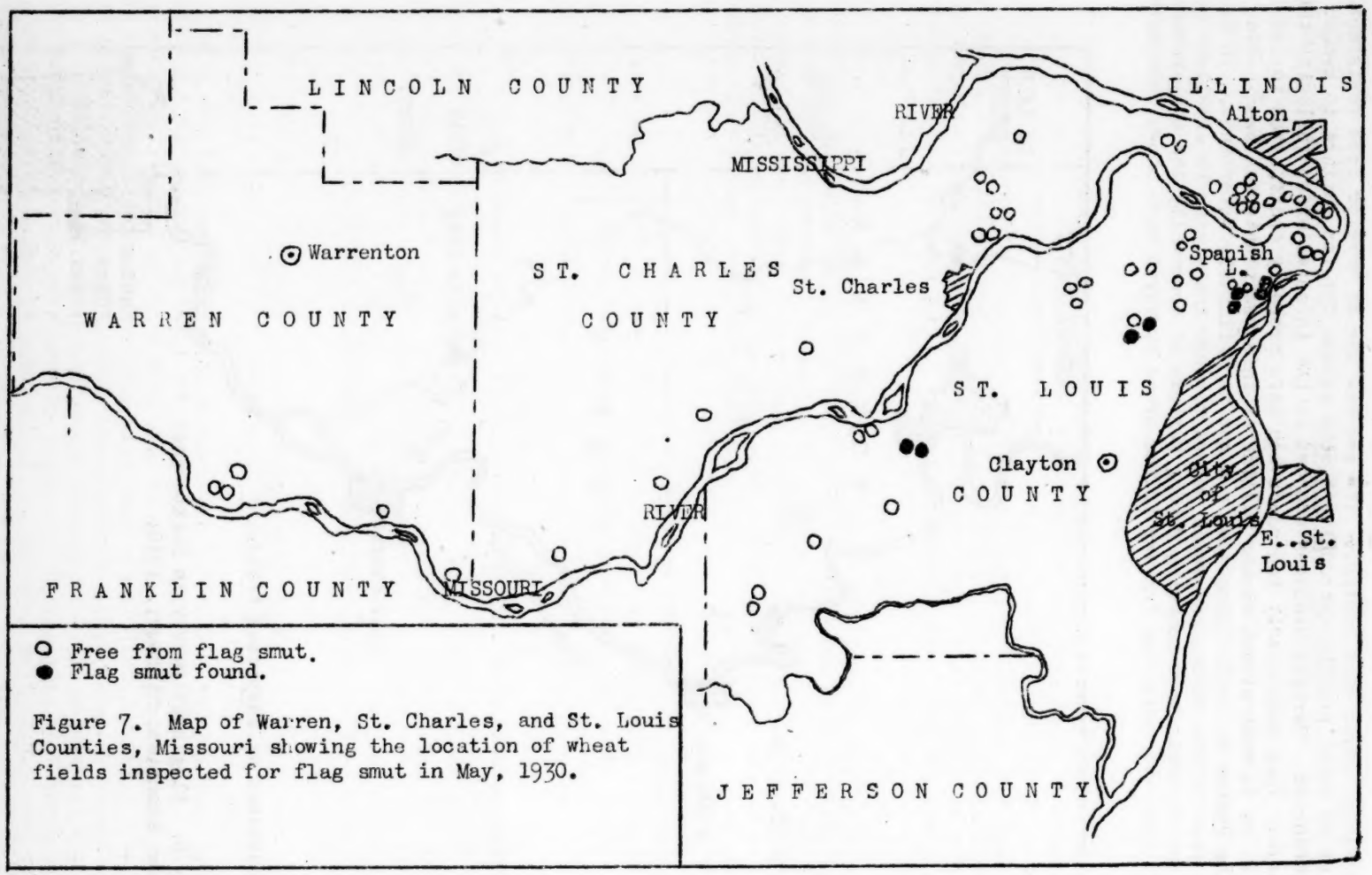


Figure 7. Map of Warren, St. Charles, and St. Louis Counties, Missouri showing the location of wheat fields inspected for flag smut in May, 1930.

ble interest on their part in adopting any practices conducive to better wheat production. This would include the adoption of control measures for flag smut should it be demonstrated that it is a menace to wheat growing. (I. T. Scott and G. D. Jones)

KANSAS

(In the 1923 survey, flag smut was found in Atchison, Miami, Wyandotte, and Leavenworth Counties). In the resurvey, flag smut was not found in Atchison County, Miami County, nor Wyandotte County.

Flag smut is still present in Kickapoo and Delaware townships of Leavenworth County, Kansas. The occurrence of this disease in these localities is largely due to the fact that susceptible wheat, Harvest Queen, is grown continuously on infested land. Flag smut was not found in any of the fields where the seed had been treated and grown on land which previously had grown crops other than wheat. The percentages of infected plants in the infested areas varied from two to six per cent. In the different fields, average percentages were as follows: 6.1, 5.2 (northwest quarter of field), 4.8 (has been in wheat continuously), 2.4 (widely distributed), 2 (spotted occurrence), 1.9 (generally distributed). All of these fields were of the Harvest Queen variety. In some fields the disease occurred in spots and in these places, as high as 13 diseased plants in 100 were found. This is considerably less than that found in some places in these localities in 1923. No flag smut was found in a resistant variety on infested land.

The flag smut situation in Kansas does not appear to be a serious problem. It seems reasonable to assume that the disease could very easily be stamped out in those localities where it does still occur by the practice of crop rotation and the use of resistant varieties of wheat. (C. H. Ficke)

DISEASES OF VEGETABLE CROPS

WHITE ROT OF ONIONS IN VIRGINIA

A note on page 81 of the May 15 issue of the Reporter recorded the second finding of Sclerotium cepivorum causing white rot of onion in Virginia and the fourth authentic report of its occurrence in this country. Collaborator S. A. Wingard, together with H. A. Noblin, County Agent, and T. C. Johnson and Harold T. Cook of the Virginia Truck Experimental Station, visited the farm where the disease was found. He states that this farm is located in Prince George County instead of in Surry County, as was thought from the address given with the specimens. The following detailed report of the occurrence and the photographs reproduced in Plate 4 were contributed by Dr. Wingard.

We found three small plots of onions on the McCoy farm of about one-eighth to one-fourth of an acre each. Plot 1 consisted of 10 rows 100 yards long. The soil in this plot is a sandy loam and very poor. It was fertilized with a complete fertilizer and limed before the bulbs were planted on November

28, 1929. The bulbs which were grown on the same farm were soaked for two and one-half hours in a formaldehyde solution, 1 pint to 30 gallons of water, and then let stand in the crates over night. One row was planted with untreated bulbs. There was no difference in the amount of infection in the plants from the treated and untreated bulbs. It was a hard matter to find a healthy plant in the whole plot. Onions were grown on this soil about four years ago. There were many rotten and mummied bulbs in the storage house, indicating that the 1929 crop of bulbs was infected with white rot.

Plot 2 was composed of seedlings about four inches tall. The seed came from Mr. McCoy's 1929 crop and were seeded in March. The soil in the drill was treated with formaldehyde. Onions had been grown on this plot two years ago. There was considerable damping-off in this plot but we couldn't tell whether it was due to Sclerotium cepivorum or other fungi.

Plot 3 had been planted with sets from the 1929 crop. These plants were just beginning to come through the soil. We couldn't tell anything about this plot. The unplanted sets from the same lot, however, were apparently infected with the white rot fungus. Sets from this same lot had just been planted in Mr. McCoy's vegetable garden.

Mr. McCoy calls his onion the upland-grown strain of Underwood Large Yellow Globe. He has been working with this strain about 35 years. He brought it to Virginia in 1907 when he moved here from Ohio. He has lived in various places in eastern Virginia and has lived on the present farm about eight years. He states that he never had any disease in his onions until he grew them on the farm where he now lives. It is interesting to note that this farm is owned and was previously operated by a Bohemian. There are a lot of Bohemians in Prince George County. Mr. McCoy grew his onion stock in the vegetable garden on the Bohemian farm six years ago, and it is my opinion that this home garden was the source of infection for his onions. The Bohemian owner no doubt brought over infected bulbs from abroad and in that way contaminated his garden soil with the white rot organism.

I am of the opinion that the soil on the McCoy farm is now generally infested with the white rot fungus. Prof. T. C. Johnson and Mr. Harold T. Cook are planning to keep a close watch on the farm and in that way determined more definitely what the situation there really is.

FROST DAMAGE TO CANNING PEAS IN WISCONSIN

In regard to frost damage in Wisconsin, I have canvassed the situation with the Secretary of the Pea Canners Association and Dr. J. C. Walker of our department, who have visited in all the canning sections of the state. Something over 3,000 samples have been examined and it is estimated that a loss to Alaskas will run over 50 per cent. The loss to Sweets will probably be between 5 and 10 per cent. Many of the field men and farmers are more optimistic than this but when careful examination is made of the developing buds in the Alaska plants, they are found to be more than half damaged. New growth will be so late that it will have little canning value.

The frosts which did damage to Wisconsin peas occurred on May 17, 24, 26, and 29. (R. E. Vaughan, June 4)

An unnumbered mimeographed publication, "Freeze Damage to Canning Peas", issued by the Bureau of Agricultural Economics, June 7, corroborates the above statement and reports injury in Illinois and Minnesota also.

FRUIT DISEASES

BROWN ROT BLOSSOM BLIGHT OF CHERRIES IN NEW YORK

May 21 was spent in the cherry orchards of the intensive cherry-growing area adjoining Lake Ontario in Northern Wayne County, determining the amount of brown-rot blossom blight. Blossoms which were injured by low temperatures were easily distinguished since the pistils were dead and the blossom pedicels only half the length of the uninjured blossoms. Records were not made of the percentage of the blossoms injured by low temperatures but this was estimated to be 10 to 20 per cent. The set of buds was so heavy that this injury was not of economic importance.

The extremely warm weather brought the cherries into bloom so rapidly that only part of the sweet cherries and none of the sour varieties received a pre-blossom application. A favorable infection period occurred about two days after the petals of sweet varieties fell. At the time of this rain, the petals were falling in the Montmorency variety but English Morellos were still in full bloom. Counts of 100 blossoms per tree were taken from five to twenty trees in each variety. The percentage of brown-rot in English Morello blossoms varied from 0.3 to 18.1 with an average for 5,500 blossoms of 9.91. In Montmorencies, the percentage varied from 0.5 to 13.67 with an average for 3,900 blossoms of 7.23. Such a large number of uninjured fruit appeared to be set that the loss in no case seemed to be of economic importance.

Schmidts Biggareau in one orchard which received no pre-blossom application and where the petal-fall application was applied after the infection period showed 87.3 per cent brown-rot on a count of 1,000 blossoms. In two other orchards of this variety where a pre-blossom spray of 1 to 40 lime-sulfur and a petal-fall application of dusting sulfur were made prior to the infection period, the percentages of brown-rot were 0.4 and 2.05 per cent with an average for 2,500 blossoms of 1.72 per cent.

In counts of only 500 blossoms each, 65.0 per cent of the blossoms showed brown-rot in the Napolean variety and 44.8 per cent in Black Tartarians. These trees received no pre-blossom and the petal-fall application was of sulfur dust applied after the infection period.

A count of 500 blossoms of the Windsor variety which received the lime-sulfur pre-blossom and a petal-fall dust prior to the rain showed no brown-rot.

Brown-rot blossom-blight in cherries is more abundant in this area than during the past six years but even this season the loss in sour cherries is negligible. In sweet cherries, severe loss occurred where the pre-blossom and petal-fall applications were omitted. (W. D. Mills, May 24)

REPORTS ON APPLE SCAB (VENTURIA INAEQUALIS)

Massachusetts: Apple scab was first reported this year on June 4, County Agent Locke collecting it in an unsprayed orchard in Hampden County, and I observing it on both leaves and fruits in a poorly sprayed orchard in Hampshire County. The oldest spots had

perhaps been discernible since June 1 or 2. No doubt the rainy period of May 14-16 furnished conditions for infection, occurring during late blossom and calyx. Although ascospore maturity began early this spring, the unusually dry weather up to May 10-14 checked both maturity and discharge of spores and delayed infection. At present, the majority of ascospores have been discharged from leaves in the earlier sections; in the later sections, from 35 to 75 per cent discharge. With the first infection periods occurring after the pink or calyx spray, depending on the section, growers expect little difficulty generally in securing good control of scab. (O. C. Boyd, June 7)

New York: From examination of the scab fungus in overwintered leaves of apple, there appears to be an unusually large amount of primary inoculum still present. Counts of perithecia are still too small in number to be conclusive, but apparently nearly half of the mature ascospore material is still present in leaves of McIntosh variety while the great bulk of the ascospores are still present in leaves of later maturing varieties such as Rhode Island Greening. (W. D. Mills, May 24)

Arkansas: Almost completely absent from orchards this year, probably due to the extremely dry weather during April.

APPLE RUST (GYMNOSPORANGIUM JUNIPERI-VIRGINIANAE)

Massachusetts: Uredo stage especially plentiful this year. Two "waves" of appearance, April 20, and May 23. Counted 70 galls in one cedar. (Davis and Boyd, June 4).

Alabama: Infections rather general and heavy on fruits and leaves, wherever apples are grown. Seldom is an orchard found without red cedars in proximity. (J. L. Seal, June 15)

Arkansas: Very favorable weather for the dissemination of cedar rust occurred during the first two weeks in May and it is beginning to show in considerable amounts in the vicinity of cedar trees. Very severe infection was noted at Fayetteville on the Bechtel flowering crab. Considerable injury may be expected where cedars have not been eradicated. (V. H. Young, June 4)

BLIGHT (BACILLUS AMYLOVORUS) ON APPLE

South Carolina: Specimens broughtin by orchard owner near Longcreek, Oconee County. Reported damage severe, $500.00 loss, in comparatively small orchard, May 2, 1930. (G. M. Armstrong, June 15)

Alabama: More general than in past few years. In the college orchard, the varieties Breitingheimer and Keskmit are rather heavily infected. These two varieties show blossom, twig and leaf infec-

tions. Had there been the usual rains during the past two months, we would undoubtedly have had a serious epidemic. (J. L. Seal, June 15)

Kentucky: There is extensive blossom blight in Johnson and neighboring counties and reports from Adair and Warren Counties indicate extensive injury. The season has been exceedingly dry but in Johnson County a rain occurred while pears were in bloom, and a light shower while apples were in bloom. Blight appears to have spread from blighted pears, in one orchard, to apples, as below an over-wintering pear canker a cone of infected twigs and blossoms was found, while over-wintering cankers have not been found on apples in this orchard. (W. D. Valleau)

WINTER INJURY TO FRUITS IN ALABAMA

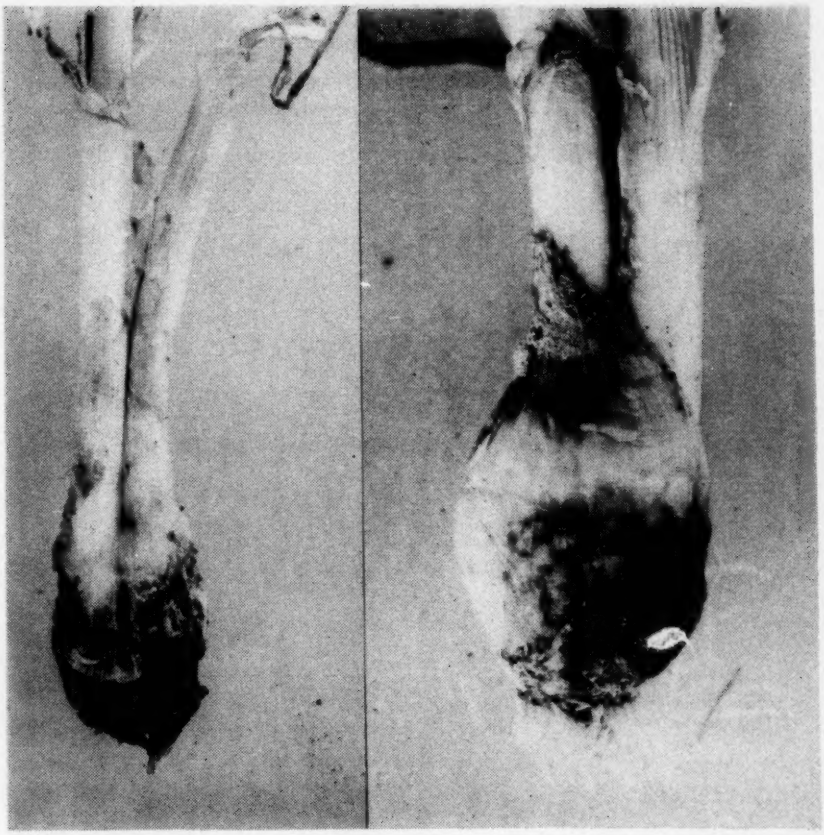
Peach trees were materially injured during the late winter freezes. The small fruits were also injured in early spring and some are showing the effect by dropping, while others show a banding and a darkening of the vascular system which is accompanied by gummosis.

Undoubtedly the greatest loss suffered so far this year has been to the satsuma growers. The trees were materially injured in all sections by freezing. The injury has been in some cases a complete killing of the trees, while in others, crown, crotch and twig injury. The above took place in some instances in spite of orchard heaters. (J. L. Seal, June 15)

BLACK ROT OF GRAPES (GUIGNARDIA BIDWELLII) IN ARKANSAS

Although excellent weather conditions have prevailed for grape spraying, considerable amounts of black rot had already appeared at the time of the post-blossom spray on May 19. In vineyards which had not received the pre-blossom spray, considerable amounts of leaf spotting, black rot in bunches, and lesions on petioles and canes were noted. A very interesting feature this year which seems to be somewhat unusual is a heavy infection on suckers, which was already present on May 19 at the time of the post-blossom spray. Many suckers, even in well sprayed vineyards showed dozens of separate lesions with spores practically mature and ready to be discharged. Due to the considerable amounts of winter injury this year, an unusual numbers of suckers have appeared at the base of plants and it seems apparent that large number of spores from overwintered sources must have been present in the soil water just at the time these suckers were pushing through the soil, since the infections appear from slightly below the soil line up to about one foot above it. It seems apparent that spores from overwintered sources must have been mature at a much earlier time than we have commonly supposed that they were to be found. (V. H. Young, June 4)

Plate 4.



Onion bulbs from farm in Prince George County, Virginia, affected by white rot caused by Sclerotium cepivorum. Photographs furnished by S. A. Wingard.